

circuitry for the amplification of said impact detection sensor signal and conversion to an impact sensor digital signal;

a doppler microwave speed measurement sensor responsive to movement of said rolling golf ball by providing a doppler audio output signal whose frequency is proportional to the speed of said rolling golf ball;

circuitry for the amplification of said doppler audio output signal and conversion of said doppler audio output signal to a doppler microwave speed measurement digital signal;

a green speed setting switch allowing selection of a stimp value in which to simulate, said green speed setting switch having a plurality of possible stimp settings for simulating a variety of green speeds;

a microcontroller to receive said doppler microwave speed measurement sensor digital signal, said impact sensor digital signal, and said green speed setting switch, wherein said microcontroller determines a rolling golf ball estimated speed in accordance with said doppler microwave speed measurement sensor digital signal, wherein said microcontroller determines an estimated putting distance in accordance with said rolling golf ball estimated speed and said green speed setting switch value; and

means for communicating said estimated putting distance to a golfer.

**2. (Canceled)** The golf putting training device of claim 1 further including:

a microprocessor rolling progress output signal to indicate a simulated rolling progress of a simulated rolling golf ball as it would have traveled said estimated putting distance past said target strike plate; and

means for communicating said simulated rolling progress of said simulated rolling golf ball to a golfer;

whereby the golfer is provided with an accurate indication of the distance a putt golf ball would have traveled past a target strike plate on a simulated green having the selected stimp value green speed after impact with the target strike plate.

**3. (Canceled) A golf putting training device comprising:**

a housing;

a target strike plate mounted to the front side of said housing which serves as a putting target and receives an impact of a rolling golf ball, wherein a layer of impact absorbing material is sandwiched between said housing and said target strike plate;

an impact detection sensor responsive to said impact of said rolling golf ball with said target strike plate;

circuitry for the amplification of said impact detection sensor signal and conversion to an impact sensor digital signal;

a doppler microwave speed measurement sensor responsive to movement of said rolling golf ball by providing a doppler audio output signal whose frequency is proportional to the speed of said rolling golf ball;

circuitry for the amplification of said doppler audio output signal and conversion of said doppler audio output signal to a doppler microwave speed measurement digital signal;

a microcontroller to receive said doppler microwave speed measurement sensor digital signal and said impact sensor digital signal, said microcontroller determining a rolling golf ball estimated speed in accordance with said doppler microwave speed measurement sensor digital signal, wherein said microcontroller outputs said rolling golf ball estimated speed to a peripheral interface port;

whereby a peripheral computing device receives said rolling golf ball estimated speed, determines an estimated putting distance, and communicates said estimated putting distance to a golfer.

**4. (New) A golf putting training device comprising:**

a housing constructed of material capable of passing microwave signals from the interior of said housing to an exterior object;

a target strike plate mounted to the front side of said housing which serves as a putting target and receives an impact of a rolling golf ball struck by a golfer with a putter from a short distance away, wherein a layer of impact absorbing material is sandwiched between said housing and said target strike plate;

positional stabilization means comprising a heavy weight placed inside said housing and a plurality of bumpers attached to the bottom of said housing;

a doppler microwave speed measurement sensor positioned within said housing behind said strike plate such that emitted microwave energy projects outward through said strike plate on a direct path toward said golf ball, said doppler microwave speed measurement sensor being responsive to movement of said golf ball by providing a doppler audio output signal whose frequency is proportional to the speed of said golf ball;

circuitry for the amplification of said doppler audio output signal and conversion of said doppler audio output signal to a doppler microwave speed measurement digital signal;

green speed setting means responsive to selection of a plurality of green speed values and for display of said green speed values to said golfer;

an impact detection sensor responsive to said impact of said golf ball with said target strike plate;

circuitry for the amplification of said impact detection sensor signal and conversion to an impact sensor digital signal ;

a circular memory buffer comprised of a plurality of random access memory elements for the storage and retrieval of period measurements of every cycle of said doppler microwave speed sensor digital signal;

a write index for clockwise storage of said period measurements in said circular memory buffer, said write index also serving as a read index for counter-clockwise retrieval of said period measurements from said circular memory buffer upon said impact of said golf ball with said target strike plate.

signal processing means to process said doppler microwave speed measurement digital signal, said impact sensor digital signal, and said green speed setting means, said signal processing means including means for accessing said period measurements from said circular memory buffer using said write index as a counter-clockwise read index, means for determining an estimated speed of said golf ball using said green speed setting means, means for determining an estimated putting distance and an output for rolling progress wherein said signal processing means communicates said estimated putting distance to said golfer.

**5. (New) A golf putting training device comprising:**

a housing constructed of material capable of passing microwave signals from the interior of said housing to an exterior object;

a target strike plate mounted to the front side of said housing which serves as a putting target and receives an impact of a rolling golf ball struck by a golfer with a putter from a short distance away, wherein a layer of impact absorbing material is sandwiched between said housing and said target strike plate;

positional stabilization means comprising a heavy weight placed inside said housing and a plurality of bumpers attached to the bottom of said housing;

a doppler microwave speed measurement sensor positioned within said housing behind said strike plate such that emitted microwave energy projects outward through said strike plate on a direct path toward said golf ball, said doppler microwave speed measurement sensor being responsive to movement

of said golf ball by providing a doppler audio output signal whose frequency is proportional to the speed of said golf ball;

circuitry for the amplification of said doppler audio output signal and conversion of said doppler audio output signal to a doppler microwave speed measurement digital signal;

an impact detection sensor responsive to said impact of said golf ball with said target strike plate;

circuitry for the amplification of said impact detection sensor signal and conversion to an impact sensor digital signal ;

a circular memory buffer comprised of a plurality of random access memory elements for the storage and retrieval of period measurements of every cycle of said doppler microwave speed sensor digital signal;

a write index for clockwise storage of said period measurements in said circular memory buffer, said write index also serving as a read index for counter-clockwise retrieval of said period measurements from said circular memory buffer upon said impact of said golf ball with said target strike plate.

signal processing means to process said doppler microwave speed measurement digital signal, said impact sensor digital signal, said signal processing means including means for accessing said period measurements from said circular memory buffer using said write index as a counter-clockwise read index, means for determining an estimated speed of said golf ball and means to output said estimated speed of said golf ball to a peripheral interface port;

a personal computer to receive said estimated speed of said golf ball from said peripheral interface port of said signal processing means,

a green speed setting selector within a user interface program running on said personal computer allowing selection of a stimp value in which to simulate, said green speed setting selector having a plurality of possible stimp settings for simulating a variety of green speeds;

whereby said personal computer receives said estimated speed of said golf ball and uses said stimp setting from said green speed setting selector and

determines an estimated putting distance, and outputs a rolling progress and said estimated putting distance to said golfer

**6. (New)** A method of estimating the roll distance of a golf ball struck by a golfer with a putter comprising the steps of:

providing a housing that includes a ball impact strike plate, a doppler microwave speed measurement sensor, doppler microwave speed measurement amplifier and schmitt trigger, impact sensor and associated amplifier and schmitt trigger, microcontroller, green speed setting switch, circular memory buffer of size  $n$ ; a heavy weight, bumpers mounted on the bottom side of the housing, and a display for outputting the estimated roll distance;

positioning the housing a short distance from the starting position of the golf ball such that the impact strike plate is orthogonal to the intended path of the golf ball so that a golfer of minimal skill can putt the golf ball and cause a collision of the rolling golf ball with the impact strike plate;

positioning the doppler microwave speed measurement sensor behind the impact strike plate within the housing such that the rolling golf ball is illuminated by the doppler microwave speed measurement sensor which provides an audio output signal indicative of the golf ball's speed ;

amplifying the doppler microwave speed sensor audio output signal and converting the amplified doppler microwave speed sensor audio output signal to a digital signal by connecting it to a schmitt trigger. The output of the schmitt trigger connecting to a first interrupt pin of a microcontroller that responds to each negative edge of the microwave speed sensor digital signal;

positioning an impact sensor within the housing to respond with a signal when the impact strike plate is struck by the rolling golf ball;

amplifying the impact sensor signal and converting the amplified impact sensor signal to a digital signal by connecting it to a second schmitt trigger. The output of the second schmitt trigger connecting to a second interrupt pin of the microcontroller;

processing the doppler microwave speed sensor digital signal by storing the elapsed time between interrupt negative edges into a circular memory buffer for any movement of any object within the doppler microwave speed sensor's field of view;

processing the impact detection interrupt by halting any further interrupts of the doppler microwave speed sensor digital signal, and starting at the most recent elapsed time stored and working backwards, select a subset of the newest elapsed time measurements from the circular memory buffer that represent the speed of the rolling ball just prior to impact with the impact strike plate;

processing the set of elapsed time measurements with the green speed setting switch and arriving at an estimated golf ball rolling distance that the golf ball would have rolled past the impact strike plate; and

outputting the estimated golf ball roll distance to a golfer.